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16 **UNITED STATES DISTRICT COURT**
17 **NORTHERN DISTRICT OF CALIFORNIA**
18 **SAN FRANCISCO DIVISION**

19 HUAWEI TECHNOLOGIES CO., LTD.,
20 HUAWEI DEVICE USA, INC., and
21 HUAWEI TECHNOLOGIES USA, INC.

22 Plaintiffs / Counterclaim-
23 Defendants,

24 v.

25 SAMSUNG ELECTRONICS CO., LTD.,
26 SAMSUNG ELECTRONICS AMERICA,
27 INC.,

28 Defendants / Counterclaim-
Plaintiffs,

and

SAMSUNG RESEARCH AMERICA,

Defendant,

v.

HISILICON TECHNOLOGIES CO., LTD.,

Counterclaim-Defendant.

Case No. 16-cv-02787-WHO

**PLAINTIFFS' OPPOSITION TO
DEFENDANTS' PARTIAL MOTION TO
DISMISS UNDER RULE 12(b)(6)**

Date: October 26, 2016
Time: 2:00 p.m.
Courtroom: 2
Judge: Hon. William H. Orrick

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Huawei Technologies Co., Ltd., Huawei Device USA, Inc., and Huawei Technologies USA, Inc. (collectively, “Plaintiffs” or “Huawei”) hereby oppose Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Research America’s (collectively, “Defendants” or “Samsung”) Partial Motion to Dismiss under Fed. R. Civ. P. 12(b)(6) (“Mot.”) (Dkt. 39).

I. INTRODUCTION

In modern cellular networks, a mobile device begins the process to connect to the network by transmitting certain radio signals to a base station. These radio signals are based on certain sequences – a special set of elements. This is a complex process. The network consists of a series of cells with the radius of a single cell ranging in size from 1km (.62 miles) to 100 km (62 miles). There can be thousands of mobile devices within a cell at any one time and multiple cells in close proximity to each other. Transmission speeds continue to increase, and the amount of data transmitted on the network continues to expand. This density of transmission signals within and between the network cells can cause multiple mobile device signals to arrive at the base station simultaneously, thereby causing what is known as “signal interference.” Huawei’s U.S. Patent No. 8,416,892 (“the ‘892 patent”) and U.S. Patent No. 8,644,239 (“the ‘239 patent”) provide innovative ways for mobile devices to reduce signal interference when transmitting sequence-based radio signals in a cellular network.

The ‘892 patent is directed to reducing interference during a mobile device’s transmission of a Random Access Preamble (“RAP”) to a base station. RAPs contain sequences that are used to initiate a connection and synchronize the mobile device with the base station. ‘892 patent at 1:25-28. Within the RAP sequence is a “Zero Correlation Zone” (“ZCZ”) of a particular length. The RAP sequence may be cyclically shifted (for example, sent at a later point in time as indicated by shifting the sequence elements in it to the right with the elements at the end being wrapped around to the beginning of the sequence) in order to achieve low correlation (i.e., low interference) between the shifted sequence and the original, unshifted sequence (known as a “root” sequence). The claims of the ‘892 patent describe a mobile device creating a RAP that has low correlation with RAPs used by other mobile devices seeking to connect with the base station. For example, claim 1 of the ‘892 patent recites a method of selecting a RAP with a particular ZCZ length of $N_{CS} - 1$. As claimed in

1 the ‘892 patent, N_{CS} is a cyclic shift increment selected from a specific, pre-defined set of cyclic shift
2 increments including 0, 13, 15, 18, 22, 26, 32, 38, 46, 59, 76, 93, 119, 167, 279, 419. *Id.* at 9:31-41.
3 Using a limited number of shift increments reduces the signaling between the mobile device and the
4 base station, thus making the system more efficient. Smaller cells will use shorter ZCZs and larger
5 cells will use longer ZCZs, all derived from the pre-defined set of possible N_{CS} values. *Id.* at 2:61-
6 65.

7 The ‘239 patent is directed to reducing interference in a related but different context, namely,
8 between mobile devices in one cell and mobile devices in another nearby cell when the devices have
9 active uplink communications sessions established. The ‘239 patent explains that when a mobile
10 device selects a sequence for data transmission within a cell, “low cross correlation and low
11 interference” with sequences in other cells is optimal. ‘239 patent at 2:48-54. The claims of the
12 ‘239 patent describe ways of allocating and processing sequences to reduce inter-cell interference.
13 *Id.* at 21:26-28. For example, claim 6 of the ‘239 patent recites a method whereby a mobile device
14 obtains a group number of a sequence group allocated by the system, selects n sequences from a
15 candidate sequence collection to form sequences in a sub-group, generates corresponding sequences
16 according to those in the formed sub-group, and communicates according to the sequences on time
17 frequency resources. The ‘239 patent explains that the sequence that results in the smallest $|r_m/N_m -$
18 $k/N_1|$ value is selected and included in the sequence group. *Id.* at 21:34-37.

19 The claims of Huawei’s ‘892 and ‘239 patents are not, as Samsung argues, simple
20 “mathematical formulas.” Mot. at 1. The ‘892 claims recite specific steps to be performed by a
21 mobile device to create a low correlation, low interference RAP that is transmitted to the base station
22 to enable synchronization of the mobile device and base station. The ‘239 claims recite specific
23 steps to create a sub-group of sequences that have a low correlation and low interference with
24 subgroups in other cells. This increases the uplink capacity of the cells, increasing the speed of data
25 transfer and improving the mobile device user’s experience.

26 Samsung’s motion seeks to gut the claims of these inventive aspects by simply ignoring most
27 of the claim language and instead focusing on limitations that it contends are “abstract ideas” of
28 “mathematical formulas.” The Federal Circuit explicitly rejected such an approach just this month,

1 explaining that “in determining the patentability of a method, a court must look to the claims as an
2 ordered combination, without ignoring the requirements of the individual steps.” *McRO, Inc. v.*
3 *Bandai Namco Games America*, No. 15-1080, slip op. at 21 (Fed. Cir. Sept. 13, 2016). When
4 considered in their entirety, the ‘892 and ‘239 patent claims are a far cry from claims that have been
5 held to be patent-ineligible under § 101. The ‘892 and ‘239 patents do not claim just any
6 “mathematical formula with ‘post solution activity,’” as Samsung asserts (Mot. at 1), but rather, very
7 specific steps to achieve a very specific result.

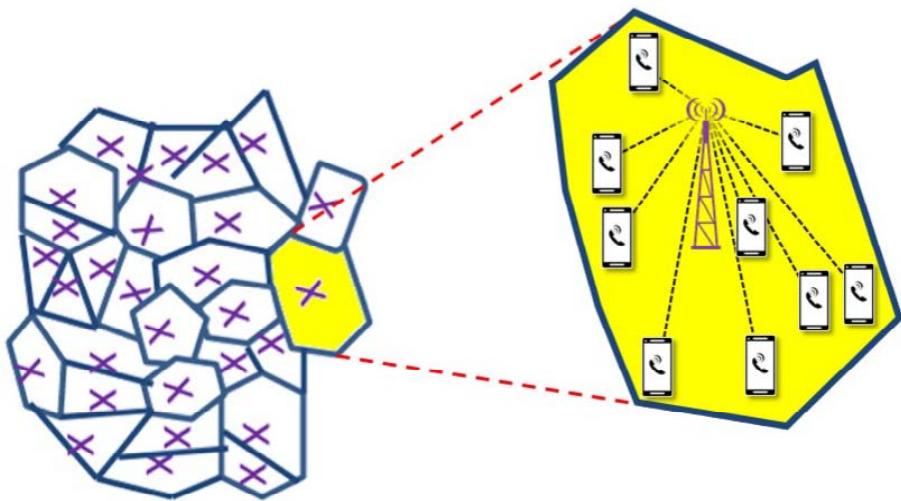
8 In essence, Samsung argues that the challenged claims cannot be patent eligible because
9 they involve “math.” But a long line of Supreme Court precedent has confirmed the patentability
10 of claims that involve the use and application of mathematics and formulas. Indeed, much like the
11 claims at issue here, in *Diamond v. Diehr*, the Court held patent eligible claims that involved the
12 application of a well-known formula in curing rubber. *See generally Diamond v. Diehr*, 450 U.S.
13 175 (1981). The logic of *Diehr* was reaffirmed in *Mayo Collaborative Services v. Prometheus*
14 *Laboratories, Inc.*, 132 S. Ct. 1289 (2012) and *Alice Corp. Pty. Ltd., v. CLS Bank Intern.*, 134 S.
15 Ct. 2347 (2014). And in *McRO*, the Federal Circuit held that claims directed to using a “set of
16 rules” on a computer to produce lip synchronization in animated characters were patent eligible,
17 even though these rules were mathematical procedures and lip synchronization of animated
18 characters was a known process. Similarly, the challenged claims here are directed to improving a
19 technological process – namely, reducing interference among mobile devices due to multiple
20 simultaneous mobile device transmissions within a cellular network. They do not simply instruct
21 the reader to “apply it.” None of the cases that Samsung cites supports the proposition that such
22 claims are patent ineligible. For these reasons, as described more fully below, Samsung’s motion
23 to dismiss should be denied.

24 **II. THE PATENTS-IN-SUIT**

25 **A. The ‘892 Patent**

26 The ‘892 patent provides efficient solutions to the potential interference that can be created
27 by many mobile devices within a cell initiating synchronization procedures simultaneously. As
28

1 background, cellular telecommunications systems provide geographically broad coverage by using
2 a series of cells, depicted conceptually below:



11
12 Each cell contains a base station (indicated as X on the left and by a tower on the right) that
13 receives radio signals from, and transmits radio signals to, multiple mobile devices within the
14 geographic area of the cell. As the figure shows, cells can be of different sizes and shapes. When
15 a mobile device enters a cell, it must establish a connection with the network to be able to transmit
16 and receive data allowing it to initiate a phone call, send a text, check email, upload a photo,
17 browse a website, or perform any of the limitless other data-related applications that may be
18 present on the mobile. As part of the process of establishing this connection, the mobile device
19 synchronizes the timing of its transmissions with the base station.

20 Because radio signals travel at a constant speed (the speed of light), communications take
21 different amounts of time to travel between the base station and the mobile device, depending on
22 the distance between the base station and the mobile device within the cell. Mobile devices far
23 from the base station will take longer to receive signals from the base station (“downlink” signals)
24 than those close to the base station; correspondingly, it will take longer for the base station to
25 receive signals from mobile devices (“uplink” signals) that are far from the base station than
26 signals from mobile devices that are close to the base station. ‘892 patent at 1:38-47. This
27 variance makes synchronization challenging because the base station does not know how far the
28 signal from a mobile device has traveled and thus how much the transmission delay has affected

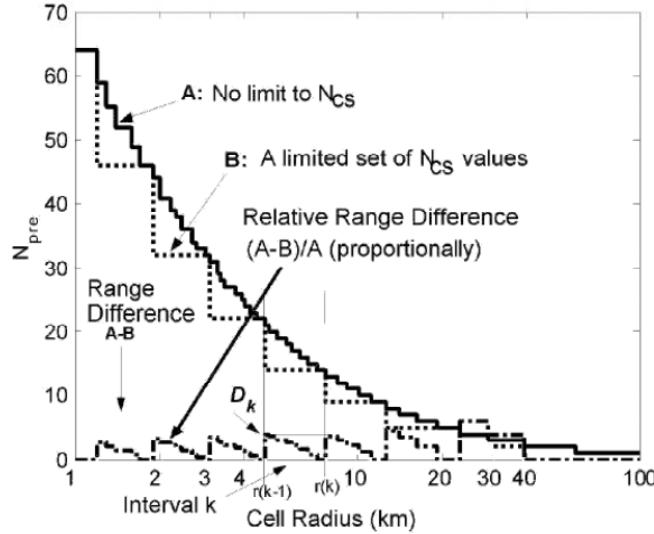
1 the timing of the received signal from the mobile.

2 The ‘892 patent explains that “a Random Access Preamble is normally transmitted to a
3 base station by a mobile terminal to initiate the random access procedure and to enable
4 synchronization of the mobile terminal with the base station.” *Id.* at 1:25-28. When multiple
5 mobile devices attempt to use the random access process simultaneously, the “uncertainty in round
6 trip time causes interference between uplink signals transmitted by different mobile terminals,”
7 thereby preventing the base station from being able to differentiate between mobiles requesting
8 access. *Id.* at 1:48-59. The propagation delay uncertainty created by the different locations of
9 mobile devices within the cell is exacerbated by the disparity in cell sizes, as the “cell radius” can
10 vary from “1 km to 100 km.” *Id.* at 2:66-67.

11 To minimize interference between mobile devices within a cell simultaneously accessing
12 the base station, and to allow the base station to distinguish signals sent from different mobile
13 devices, the mobile device transmits RAPs. The ‘892 patent describes RAPs that contain Zero-
14 Correlation Zone (“ZCZ”) lengths. In the realm of cellular communications, “zero correlation”
15 means that the two sequences do not interfere with each other, thereby allowing the base station to
16 better distinguish among multiple mobile devices if each mobile device uses a different sequence.

17 The ‘892 patent creates RAPs that substantially reduce the risk of interference with other
18 RAPs while reducing signaling needs. All mobile devices within a cell select one of 64 RAPs. To
19 reduce interference, this set of RAPs uses ZCZ sequences. *Id.* at 9:34-41; 10:30-37. RAPs
20 generated with ZCZ sequences of a proper length for the cell size prevent a given sequence from
21 interfering with other copies of itself or with properly shifted versions of itself. *Id.* at 2:54-59.
22 These ZCZ sequences also allow the base station to distinguish signals from multiple mobile
23 devices and to accurately determine the propagation delay from each mobile device. *Id.* at 2:31-
24 47. The ‘892 patent describes RAPs as utilizing one or more “root sequences” shifted by multiples
25 of one of 16 identified cyclic shifts, resulting in non-interfering ZCZ sequences. Utilizing only 16
26 possible shifts reduces the signaling between the base station and mobile devices because the 16
27 shifts can be identified with fewer bits than a larger number of shifts.

1 The ‘892 patent reduces interference by selecting the right ZCZ length and right cyclic
2 shift. Although smaller shifts allow the mobile to generate more distinct sequences from a single
3 root sequence and thus are generally preferred,¹ as the cell gets larger, longer sequences with
4 longer cyclic shifts are necessary to account for the longer delay caused by the mobile device’s
5 greater possible distance from the base station. This reduces the number of sequences that can be
6 derived from the same root sequence, as depicted in Figure 2 of the ‘892 patent.



16 **Fig. 2**

17 Curve A of Figure 2 shows the maximum number of RAPs from a single root sequence when N_{CS} ,
18 the cyclic shift increment, can be any value. *Id.* at 4:63-5:2. Curve B shows conceptually the
19 number of RAPs available at different cell radii when using a limited set of N_{CS} values. *Id.* at 5:2-
20 8. The ‘892 patent identifies that the ZCZ length is N_{CS} -1, where the pre-defined set of cyclic
21 shift (N_{CS}) increments includes all of the following: 0, 13, 15, 18, 22, 26, 32, 38, 46, 59, 76, 93,
22 119, 167, 279, and 419. *Id.* at 9:34-41; 10:30-37. Other cyclic shift increments provide less
23 optimal results.

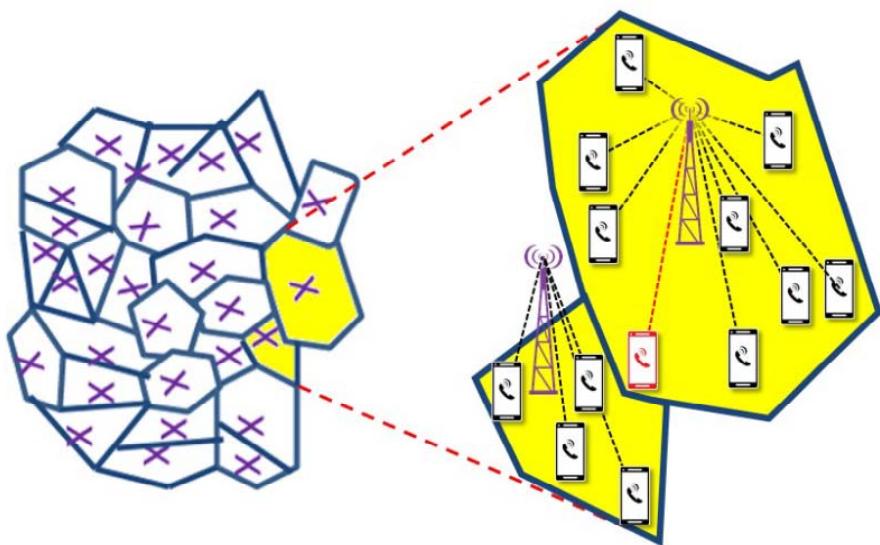
24 Thus, the ‘892 patent solves a fundamental problem in designing a cellular communications
25 system. The ‘892 patent discloses and claims transmitting a RAP selected from the set of such
26 preambles where the selected preamble differs from the other preambles in the set by the length its

27 ¹ For example, the sequence A B C D E produces five possible sequences if cyclically shifted by one
28 – i.e., A B C D E; E A B C D; D E A B C; C D E A B; and B C D E A – but produces only two
possible sequences if cyclically shifted by two – i.e., A B C D E and D E A B C.

1 ZCZ sequence is shifted from a root sequence(s). As taught and claimed by the '892 patent, the
2 inventor identified and selected particular cyclic shifts that would provide the greatest number of
3 RAPs from a root sequence for a given cell size, thereby minimizing the number of root sequences
4 needed to generate the 64 RAPs. This increases the efficiency of a mobile system by improving its
5 use of scarce resources while ensuring that interference is reduced.

6 **B. The '239 Patent**

7 The '239 patent discloses and claims a technique for assigning sequences to sequence
8 groups in a way that minimizes interference between mobile devices in nearby cells, depicted
9 conceptually below.



20 Zadoff-Chu (“ZC”) sequences are one type of mathematical sequence that is commonly
21 applied to radio signals in a cellular network because combining shifted versions of the same ZC
22 sequence typically results in low correlation between the shifted sequences. This effect allows the
23 base station to distinguish signals transmitted from different mobile devices. But unless selected
24 properly, ZC sequences used by mobile devices in nearby cells may have greater correlation and,
25 thus, may cause inter-cell interference between and among mobile devices in adjoining cells. The
26 challenge the '239 patent addresses is how to assign the sequences to minimize correlation of
27 different ZC sequences in nearby cells.

1 The ‘239 patent explains how to efficiently assign sequences to “sequence groups” based
2 on their relative correlation and thus minimize interference between cells. *Id.* at 5:37-45.
3 Correlation refers to the interference between sequences, with low correlation corresponding to
4 lower interference and high correlation corresponding to higher interference. The ‘239 patent
5 explains that sequences with high correlation should be grouped together to form a sub-group that
6 has a low correlation with other groups of sequences. *Id.* at 5:34-47.

7 Cellular systems take advantage of this division of sequences to reduce interference and
8 improve performance. Cells are assigned a particular sequence group, from which a root sequence
9 is chosen. The low correlation between ZC sequences in different groups, which are assigned to
10 different cells, reduces interference between mobile devices in different cells when the radio waves
11 travel to adjacent cells. The mobile devices in a cell can use the same root sequence in certain
12 circumstances to generate their own sequences via cyclic shifting. Because ZC sequences shifted
13 from the same root sequence have low correlation with each other, the sequences used by different
14 mobile devices within the same cell have minimal interference.

15 The ‘239 patent improves sequence grouping by providing an inventive way to allocate
16 sequences so mobile stations can communicate with the base station with minimal interference.
17 Using the selected sequence group, the patent describes selecting sequences from a candidate
18 sequence collection to form a sub-group of the sequences in the sequence group. The candidate
19 sequence collection contains all the ZC sequences of a given length. From that collection, the
20 patent describes selecting the ZC sequences of a given length that correspond to the cell’s group
21 number. This leads to a small number of ZC sequences.

22 In addition, the ‘239 patent teaches how to create these ZC sequences so that they have
23 reduced correlation (i.e., low interference) between groups, using one or more of four identified
24 mathematical relationships: $\lfloor k \cdot N_i/N_1 \rfloor$, $\lceil k \cdot N_i/N_1 \rceil$, $\lfloor k \cdot N_i/N_1 \rfloor + 1$ or $\lceil k \cdot N_i/N_1 \rceil - 1$. The ‘239
25 patent explains that “the sequence that makes the $|r_m/N_m - k/N_1|$ value the smallest is selected and
26 included into the sequence group k , thus ensuring higher correlation between sequences and
27 reducing correlation between groups.” ‘239 patent at 21:35-39. The value r_m is a basic sequence
28 index in the candidate sequence collection, N_m is a length of a sequence in the candidate sequence

1 collection, k is a serial number of the sequence group, and N_1 is a length of a reference sub-group
2 sequence. The mathematical relationships in the claim are mathematically equivalent to the
3 smallest value of $|r_m/N_m - k/N_1|$.²

4 Consequently, the ‘239 patent teaches how to assign sequences to groups so that sequences
5 within a group have high intra-sequence group correlation and sequences in different groups have
6 low inter-sequence group correlation. A cell and the mobile devices interacting with it use only a
7 few sequences, from a sequence group, making the higher interference between the sequences
8 within a group irrelevant to performance. The lower correlation between sequence groups,
9 however, ensures that sequences used in different cells minimally interfere with each other.

10 **III. LEGAL STANDARDS**

11 The first step in the two-part § 101 analysis is to determine “whether the claims at issue are
12 directed to a patent-ineligible concept.” *Alice Corp.*, 134 S.Ct. at 2355. As the Federal Circuit has
13 explained, “the first step of the inquiry is a meaningful one...and it...cannot simply ask whether
14 the claims *involve* a patent-ineligible concept, because essentially every routinely patent-eligible
15 claim involving physical products and actions *involves* a law of nature and/or natural phenomenon
16” *Enfish, LLC., v. Microsoft Corp.*, 822 F.3d 1327, 1335 (Fed. Cir. 2016) (citing *Mayo*, 132 S.
17 Ct. at 1293). For that reason, patent claims directed to specific technological improvements are
18 patent-eligible. *See, e.g., id.* at 1335-36; *see also id.* at 1338 (“the claims here are directed to an
19 improvement in the functioning of a computer ... [in contrast to] simply adding conventional
20 computer components to well-known business practices.”); *id.* at 1339 (internal cites omitted).
21 Recently, the Federal Circuit has also found that claims that “employed a well-known
22 mathematical equation” but “used that equation in a process designed to solve a technological
23 problem in a conventional industry practice” were patentable “because they improved an existing

25 ² Huawei explained to the Patent Office during prosecution of the ‘239 patent that the four identified
26 mathematical relationships in the ‘239 patent claims are disclosed in the specification. *See* Ex. A
27 (‘239 file history, 2014-04-24 Applicant Argument at 2-3). Although motions to dismiss under Rule
12(b)(6) are limited to the four corners of the complaint, to the extent the Court takes judicial notice
of the prosecution history exhibits attached to Samsung’s motion to dismiss, Huawei requests that
the Court also take judicial notice of this ‘239 prosecution history excerpt. *See, e.g., Benedict v.*
28 *Hewlett-Packard Co.*, No. 13-cv-119, 2014 WL 234218, *11 n.15 (N.D. Cal. Jan. 21, 2014).

1 technological process.” *McRO*, slip op. at 20-21 (citing *Alice*, 134 S. Ct. at 2358 and *Diehr*, 450
2 U.S. at 177, 178, 187).

3 The § 101 analysis moves to a second step only if it is determined that patent claims are
4 directed to an abstract concept. The second step requires “examin[ing] the elements of the claim to
5 determine whether it contains an inventive concept sufficient to transform the claimed abstract idea
6 into a patent-eligible application.” *Alice* at 2357. As this Court previously summarized, “the
7 relevant inquiry is whether a claim, as a whole, includes meaningful limitations restricting it to an
8 application, rather than merely an abstract idea.” *France Telecom S.A. v. Marvell Semiconductor
9 Inc.*, 39 F. Supp. 3d 1080, 1090 (N.D. Cal. 2014) (Orrick, J.) (quoting *Ultramercial, Inc. v. Hulu*,
10 LLC, 722 F.3d 1335, 1342 (Fed. Cir. 2013)).³

11 Underlying the patent eligibility analysis is whether the challenged claims pose a risk of
12 preemption. *See, e.g., Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1379 (Fed. Cir.
13 2015) (“The Supreme Court has made clear that the principle of preemption is the basis for the
14 judicial exceptions to patentability.”); *France Telecom S.A. v. Marvell Semiconductor Inc.*, 39 F.
15 Supp. 3d 1080, 1089, 1092-93 (N.D. Cal. 2014); *California Inst. of Tech. v. Hughes Commc'n's
16 Inc.*, 59 F. Supp. 3d 974, 990 (C.D. Cal. 2014); *Intellectual Ventures I, LLC v. Canon Inc.*, 143 F.
17 Supp. 3d 143, 173–74 (D. Del. 2015). Even the cases Samsung cites make this point. *See Thales
18 Visionix, Inc. v. United States*, 122 Fed. Cl. 245, 252 (2015) (“Ultimately, the concern that drives
19 the exclusionary exceptions for abstract ideas and laws of nature from § 101 eligibility “[i]s one
20 of pre-emption.””).

21 **IV. ARGUMENT**

22 The chief concern that animates § 101 jurisprudence is guarding against patent claims that
23 preempt all uses of a law of nature or an abstract idea. There is no danger of that here, aptly

24 ³ Like this case, *France Telecom* involved telecommunications patents challenged for allegedly
25 claiming mathematical algorithms. *France Telecom* remains good law, even though it was decided
26 shortly before *Alice*, because it relies upon the Supreme Court’s *Mayo* decision and the Federal
27 Circuit’s *Alice* decision that the Supreme Court affirmed. Recent Federal Circuit cases have also
28 applied the same reasoning as *France Telecom*. *See, e.g., Elec. Power Grp., LLC v. Alstom SA*,
No. 2015-1778, 2016 WL 4073318 at *4 (Fed. Cir. Aug. 1, 2016) (relying on distinction between
“an improvement in computers as tools” compared to “abstract ideas that use computers as tools”).

1 demonstrated by the absence of *any* discussion of preemption in Samsung’s motion.⁴ The
2 challenged claims of the ’892 and ’239 patents are narrowly drawn to improving the operation of
3 wireless networks by solving core technological problems in those networks – for the ’892 patent,
4 identifying specific cyclic shifts to reduce interference and signaling during random access, and for
5 the ’239 patent, reducing interference during synchronized uplink communications among mobile
6 devices in different cells. The claims do not preempt all uses of the mathematical concepts they
7 implement, but rather apply them to very specific problems and technological contexts.

8 The Supreme Court and the Federal Circuit have confirmed that such types of claims are
9 patent eligible. Samsung ignores this precedent and advances the unfounded argument that a claim
10 that involves “math” is necessarily “directed to” an abstract idea. But the litany of cases that
11 Samsung cites does not support such a broad proposition. *See also Diehr*, 450 U.S. at 187-88. The
12 law is not, and has never been, that the use of mathematics or a formula in a claim renders the
13 claim patent ineligible. For example, in *Diehr*, the patent-eligible claim includes the equation “ \ln
14 $v=CZ+x$.” *Id.* at 179 n.5. Similarly, a claim including the step of “determining a driving signal, a
15 triggering signal, and a number of rotation steps according to a predetermined resolution, wherein
16 a period T_G of the triggering signal equals a period T_M of the driving signal multiplied by the
17 number of rotation steps N within the period T_G ” has recently been found patent-eligible.

18 *Intellectual Ventures I, LLC v. Canon Inc.*, 143 F. Supp. 2d 143, 169 (D. Del. 2015).⁵

19 In addition, Samsung improperly seizes upon claim limitations related to mathematical
20 operations as “abstract” and glosses over all of the other claim elements, in violation of established

21 ⁴ Samsung does not assert (much less prove) that the ’892 or ’239 patent claims pose any preemption
22 risk, and it is too late for Samsung to make such an argument, as Samsung is not permitted to raise
23 new arguments in its reply brief. *See, e.g., California Sportfishing Prot. All. v. Pac. States Indus., Inc.*, No. 15-CV-01482-JD, 2015 WL 5569073, at *2 (N.D. Cal. Sept. 22, 2015) (“Raising new
24 arguments in a reply brief is classic sandbagging, and the Court will not tolerate it.”).

25 ⁵ *See also, e.g., SiRF Technology, Inc. v. Int’l Trade Comm’n*, 601 F.3d 1319, 1331-33 (Fed. Cir.
26 2010) (holding patent-eligible a claim “for calculating an absolute position of a GPS receiver and an
27 absolute time of reception of satellite signals” that includes steps for estimating time and position as
well as “computing absolute position and absolute time using said pseudoranges by updating said
estimate of an absolute time and the estimate of position of the GPS receiver”); *Research Corp. Techs., Inc. v. Microsoft Corp.*, 627 F.3d 859 (Fed. Cir. 2010); *Wavetronix LLC v. Iteris, Inc.*, No. A-14-CA-970, 2015 WL 300726 (W.D. Tex. Jan. 22, 2015); *Oplus Tec. Ltd. v. Sears Holding Corp.*, No. 12-cv-5707, 2013 WL 1003632 (C.D. Cal. Mar. 4, 2013).

1 § 101 case law. “[C]ourts must be careful to avoid oversimplifying the claims by looking at them
2 generally and failing to account for the specific requirements of the claims.” *McRO*, slip op. at 21.

3 Step 1 of *Alice* ends the analysis. But the challenged claims also pass muster under *Alice*’s
4 Step 2 because they are restricted to the particular, limited application described above that gave
5 rise to the need for the claimed inventions. Similar patent claims in related areas of technology
6 have been found patent-eligible, as illustrated by this Court’s *France Telecom* decision. *See infra*
7 at 15-16. Samsung’s Step 2 analysis goes astray because it fails to look at the challenged claims as
8 a whole, instead discarding claim elements it contends were known in the art and reading a
9 purported “abstract” portion of each claim as an isolated element. And Samsung’s quotation from
10 the *dissent* in the Supreme Court’s *Diehr* case is unavailing. *See* Mot. at 10 (quoting *Diehr*, 450
11 U.S. at 204 (Stevens, J., dissenting)). The majority opinion expressly *rejected* Samsung’s
12 approach and explained that it was “inappropriate to dissect the claims into old and new elements
13 and then to ignore the presence of old elements in the analysis.” *See Diehr*, 450 U.S. at 188; *id.* at
14 192 (stating that “when a claim containing a mathematical formula implements or applies that
15 formula in a structure or process which, when considered as a whole, is performing a function
16 which the patent laws were designed to protect (e.g., transforming or reducing an article to a
17 different state or thing), then the claim satisfies the requirements of § 101.”). The Federal Circuit
18 has followed the majority opinion. *See, e.g.*, *Enfish*, 822 F.3d at 1335; *Bascom Global Internet*
19 *Services, Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1350-52 (Fed. Cir. 2016); *see also* *McRO*,
20 slip op. at 19-20.⁶

21 A. **The ‘892 Patent Claims Are Patent-Eligible**

22 1. ***Alice* Step 1: The ‘892 Patent Claims Are Not Directed to an Abstract
23 Idea**

24 As described in detail above, the ‘892 patent discloses using RAPs comprised of a root
25 sequence shifted a predetermined amount thereby enabling mobile devices to synchronize to a cell

26 ⁶ Samsung’s analysis is also illogical. Samsung seeks to exclude the “claimed advance over the
27 prior art” and then look for an inventive concept in what remains. *See* Mot. at 7-10. In other
28 words, Samsung asks whether any inventive concept remains after excluding the inventive concept.
That cannot be correct.

1 in a cellular network in an efficient manner that also reduces interference between mobile devices.

2 Claim 1 is representative:

3 *1. A method of facilitating communication in a mobile communication
4 system, the method comprising:*

5 *selecting, by a user equipment (UE), a random access preamble from a set
6 of random access preambles; and*

7 *transmitting, by the UE, the selected random access preamble,
8 wherein the set of random access preambles is provided with Zero
9 Correlation Zones of length N_{CS} -1,*

10 *where N_{CS} is a cyclic shift increment selected from a pre-defined set of
11 cyclic shift increments, the pre-defined set including all of the following
12 cyclic shift increments of 0, 13, 15, 18, 22, 26, 32, 38, 46, 59, 76, 93, 119,
13 167, 279, 419.*

14 Nowhere in this claim, nor in any of the other ‘892 patent claims, does Huawei attempt to
15 patent “mathematically generated number sequences” as Samsung alleges. Mot. at 2. The ‘892
16 patent claims are specifically directed to a specific technological improvement with the
17 technological goal of facilitating communication between a user equipment and cell of a mobile
18 communication network.⁷

19 Samsung’s attempt to turn the presence of numbers or any mathematical concept into an
20 automatically patent-ineligible claim is contrary to the law. *See Enfish*, 822 F.3d at 1334; *Diehr*,
21 450 U.S. at 187-88. In particular, it is legally incorrect for Samsung to isolate the specific cyclic
22 shift values from the claims of the ‘892 patent and claim that they turn the entire ‘892 patent into
23 an attempt to claim mathematics. Mot. at 7; *see McRO*, slip op. at 20 (must “look to both the claim
24 as a whole and the individual claim elements to determine whether the claims contain an element
25 or combination of elements that is sufficient to ensure that the patent in practice amounts to
26 significantly more than a patent upon the ineligible concept itself.”) (internal citations omitted).

27

⁷ Because the independent claims of the ‘892 patent are patent-eligible under § 101 as discussed, the
28 dependent claims, which are necessarily narrower than the independent claims, are patent-eligible as
25 well. Specifically, the dependent claims of the ‘892 patent add further limitations to the patentable
26 subject matter recited in independent claims 1 and 10. For example, the dependent claims add that
27 the RAPs can be generated from more than one root sequence (claims 2, 11) and the root sequence
28 can be a Zadoff-Chu sequence (claims 3, 12). These are not generic post-solution steps, as Samsung
25 contends (Mot. at 9), but rather specific and additional limitations for the RAPs that are selected and
26 transmitted by the mobile device.

1 A proper analysis must look at the claims as a whole. The Federal Circuit recently held in
2 *McRO* that claims directed to automating the process of lip-synchronization for 3-D characters
3 according to a set of rules “with specific characteristics” were patent eligible. *McRO*, slip op. at
4 27. The Federal Circuit found persuasive the fact that the “specific structure of the claimed rules
5 would prevent broad preemption of all rules-based means of automating lip synchronization” and
6 there was “no showing that any rules-based lip-synchronization process must use rules with the
7 specifically claimed characteristics.” *McRO*, slip op. at 25-26. Because the claim at issue in
8 *McRO* was “limited to a specific process for automatically animating characters using particular
9 information and techniques” and therefore did not preempt use of rules with different structure or
10 techniques, the claim was a patentable technological improvement over existing techniques in
11 conventional industry practice. *Id.* at 27.

12 As in *McRO*, the claims of the ‘892 patent solve a known problem in wireless technology
13 through a specific numeric shift, thereby improving the existing technology. *McRO*, slip op. at 20-
14 21. Importantly, the cyclic shift increments claimed here are not a “well-known mathematical
15 equation” and their use in the ‘892 patent would not result in preempting all use of ZCZ sequences
16 or cyclic shifts. *See id.* at 20-21, 27. Samsung does not allege otherwise. *See Mot.* at 7 (referring
17 to claimed specific cyclic shift values as “the supposed advancement over the prior art”). Indeed,
18 any other cyclic shift increments are still available for use in the process described by the claims,
19 and ZCZ sequences and cyclic shifts could be used freely in other applications without running
20 afoul of the ‘892 patent.

21 This Court has found similar claims, also challenged as allegedly claiming a mathematical
22 formula, patent-eligible. For example, the claims in *France Telecom* covered methods for turbo
23 coding to correct errors in telecommunication and other data transmissions, including
24 mathematical operations such as “temporally interleaving said source data elements.” 39 F. Supp.
25 3d at 1083. The defendant in that case argued that the claims “recite mere mathematical
26 computations (addition) and re-ordering of data.” *Id.* at 1094. Nonetheless, this Court found the
27 claims patent eligible, reasoning that the claims “contain[] additional substantive limitations that
28 narrow, confine, or otherwise tie down the claim so that, in practical terms, the claims do not cover

1 the full abstract idea itself” and the claims “are not simply claims to an abstract idea with the
2 instruction to apply it” or use “token post-solution activity.” *Id.* at 1090-93.⁸ *See also Enfish*, 822
3 F.3d at 1334 (emphasizing importance of “compar[ing] [the] claims at issue to those claims
4 already found to be directed to an abstract idea in previous cases.”); *California Inst.*, 59 F. Supp.
5 3d at 978, 1000 (claims related to error coding in communications were patent eligible because
6 they “improve a computer’s functionality by applying concepts unique to computing (like using a
7 linear transform operation to encode data) to solve a problem unique to computing (data corruption
8 due to noise.”). Samsung’s cited cases, on the other hand, are easily distinguishable: they
9 attempted to patent natural laws themselves, like the patent-ineligible claims in *Mayo*,⁹ or claimed
10 abstract ideas untethered to applications or physical devices.¹⁰

11

12 ⁸ The Court relied on the decision of Federal Circuit Judge Bryson, sitting by designation in *TQP*
13 *Dev., LLC v. Intuit Inc.*, No. 12-cv-180, 2014 WL 651935 (E.D. Tex. Feb. 19, 2014) as particularly
14 instructive. In *TQP*, the patent claimed a method for transmitting data over a communications link,
15 including “generating a first sequence” based on a seed value, “generating a second sequence” with
specified properties, and decrypting data in accordance with the second sequence. *Id.* Judge Bryson
found the claims eligible because they, like the ‘892 patent’s claims, “involve[] a specific system for
modifying data that has equally concrete and valuable effects in the field of electronic
communications.” *France Telecom*, 39 F.Supp.3d at 1097.

16 ⁹ *See Genetic Techs. Ltd. v. Merial LLC*, 818 F.3d 1369, 1375 (Fed. Cir. 2016) (broad claims on
17 correlating naturally occurring linkages in a DNA sequence that effectively attempted to patent the
natural law itself).

18 ¹⁰ *See Digitech Image Techs. v. Elecs. For Imaging, Inc.*, 758 F.3d 1344, 1349, 1351 (Fed. Cir.
19 2014) (concerned claims for a “device profile” that “does not fall within any of the categories of
eligible subject matter under section 101” and an “ineligible abstract process of gathering and
20 combining data that does not require input from a physical device.”); *Compression Tech. Sols. LLC*
v. *EMC Corp.*, No. C-12-01746 RMW, 2013 WL 2368039, at *7 (N.D. Cal. May 29, 2013)
21 (“sweeping claims [that] cover generalized formulations for parsing data that do not impose
meaningful limits” and claims “broadly cover almost all information processing associated with
22 compression, storage, and transmission of digital information”); *In re TLI Comm’s LLC Patent*
Litig., 823 F.3d 607, 612-13 (Fed. Cir. 2016) (claims “not directed to a solution to a ‘technological
23 problem,’” but rather “directed to the abstract idea of classifying and storing digital images in an
organized manner” and patent “fails to provide any technical details for the tangible components...”);
24 *Parker v. Flook*, 437 U.S. 584, 586 (1978) (claimed a formula without explaining how to select the
variables) (limited by Supreme Court in *Diehr*, 450 U.S. at 192 n.14 (*Flook* lacked “any disclosure
25 relating to the chemical processes at work or the means of setting off an alarm or adjusting the alarm
limit.”)); *Synopsys, Inc. v. Mentor Graphics Corp.*, 78 F. Supp. 3d 958, 965 (N.D. Cal. 2015) (Court
concluded claims “add nothing other than a way to implement that [known] mental process on a
26 computer.”); *Thales Visionix, Inc. v. United States*, 122 Fed. Cl. 245, 249, 252-53 (Fed. Cl. 2015)
27 (Court found that the claims were “directed to the abstract idea of tracking two moving objects”
without doing anything “to ground this abstract idea in a specific way.”).

2. *Alice Step 2: The '892 Patent Claims Contain an Inventive Concept Sufficient to Transform Any Alleged Abstract Idea into a Patent-Eligible Application*

Although the analysis in this case should end with Step 1, because the ‘892 patent claims do not attempt to patent an abstract idea, even if the Court were to proceed to analyze Step 2, each claim as a whole contains an inventive concept sufficient to transform any purported abstract idea into a patent-eligible application. *Alice*, 134 S.Ct. at 2355. Just as it did with Step 1, Samsung improperly categorizes each limitation as “conventional” or “novel” in isolation and then pronounces the “novel” elements abstract mathematical formulae. But as discussed above, the elements of the challenged ’892 patent claims taken as a whole are directed to a novel process in a specific and limited context – synchronizing mobile devices with a base station using a reduced set of cyclic shift increments that reflect the properties of the RAPs employed in the claimed process: 0, 13, 15, 18, 22, 26, 32, 38, 46, 59, 76, 93, 119, 167, 279, and 419. Contrary to Samsung’s improper attempt to isolate an alleged “novel” element and reduce it to nothing more than a mathematical formula, the inventive concept of the claims applies mathematical principles to solve a specific problem in a limited context. The dependent claims are necessarily narrower and add even more context. See, e.g., ‘892 patent, claim 5.

The ‘892 patent claims are far narrower than the claims the Supreme Court found eligible in *Diehr* and that the Federal Circuit just found eligible in *McRO*. *See Diehr*, 450 U.S. at 179 n.5; *McRO*, slip op. at 11. In *McRO*, the claim at issue set forth a number of steps that described and applied a set of rules but did not specify the actual rules themselves. *Id.* Samsung effectively concedes that the ‘892 patent claims are specific and narrow, albeit with confusing and self-contradictory explanations. *See* Mot. at 7 (“the ‘892 claims are directed to an abstract mathematical formula for generating *specific* sets of Zero-Correlation Zone RAPs”); *id.* (“The *specific* cyclic shift values claimed in the ‘892 patent are what constitute the supposed advance of the Patent over the prior art.”); *id.* at 8 (“But calculating a *specific* set of cyclic shift values — a set of numbers — is a quintessential non-patentable abstract idea.”); *id.* at 9 (“All these claims are thus directed to an abstract idea under Alice step 1 — namely, providing a set of Zero-Correlation Zone RAPs *by applying specific, prescribed* cyclic shift values.”) (emphases added).

1 As evident from the claim language, the ‘892 patent claims do not require mere application
2 of some cyclic shift using conventional computer components. *See Bascom*, 827 F.3d at 1349
3 (“An inventive concept that transforms the abstract idea into a patent-eligible invention must be
4 significantly more than the abstract idea itself, and cannot simply be an instruction to implement or
5 apply the abstract idea on a computer.”) (citing *Alice*, 134 S.Ct. at 2358). As in *Bascom*, where the
6 claimed arrangement of elements was held to be a technical improvement over prior art ways of
7 filtering content on the Internet, the claims of the ‘892 patent disclose a technical improvement
8 over prior art ways of attempting to reduce bandwidth use and interference. *See id.* at 1350.

9 Samsung’s argument is not supported by the cases it cites, all of which—unlike the claims
10 here—involve claims that “can readily be understood as simply adding conventional computer
11 components to well-known business practices.” *Compare Enfish*, 822 F.3d at 1338 (collecting
12 cases) *with* Mot. at 9-10 (citing *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 714–17 (Fed. Cir.
13 2014) (claims relating to business method of exchanging advertising for copyrighted content on the
14 Internet)).¹¹ In fact, none of Samsung’s cited cases except *Diehr*—where it cited the dissent—
15 involved a patent on a technological improvement, much less a telecommunications patent
16 challenged for claiming a mathematical formula. In contrast, the *France Telecom, TQP*, and
17 *CalTech* cases – which involved claims substantially similar to those challenged here – all hold
18 that the challenged claims contain an inventive concept sufficient to transform an abstract idea into
19 a patent-eligible application.

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21
22
23 ¹¹ *Netflix, Inc. v. Rovi Corp.*, 114 F. Supp. 3d 927, 931 (N.D. Cal. 2015) (claims related to “to
24 storing a user’s viewing history and making recommendations based on that history,” “use of
25 categories to organize programs,” and bookmarking); *Cyberfone Sys., LLC v. CNN Interactive
26 Grp., Inc.*, 558 F. App’x 988, 992 (Fed. Cir. 2014) (claims to “the well-known concept of
27 categorical data storage, i.e., the idea of collecting information in classified form, then separating
28 and transmitting that information according to its classification.”); *Perfect Web Techs., Inc. v.
Infousa, Inc.*, No. 07-80286-CIV, 2008 WL 6153736, at *9 (S.D. Fla. Oct. 27, 2008) (claims for
“the process of matching a profile to a group of target recipients,” and “the practice of sending e-
mails via a computer and calculating which e-mails were successfully delivered.”). *In re TLI
Comm’ns LLC Patent Litig.*, 823 F.3d 607, 612-13 (Fed. Cir. 2016) is discussed above.

B. The '239 Patent Claims Are Patent-Eligible

1. *Alice Step 1: The '239 Patent Claims Are Not Directed to an Abstract Idea*

As with the '892 patent, the '239 patent claims recite a specific improvement to mobile communications technology by disclosing a new way to generate ZC sequences to lower correlation between sequence groups used in different cells in order to reduce signal interference. Claim 6 is representative:¹²

6. A method for processing sequences in a communication system, comprising:

obtaining, by a cell or a base station or a user equipment, a group number k of a sequence group allocated by the system;

selecting, by the cell or the base station or the user equipment, n sequences from a candidate sequence collection to form sequences in a sub-group i in a sequence group k ;

wherein n is a natural number, i is a serial number of the sub-group, k is a serial number of the sequence group, a value of a basic sequence index r_i in the sub-group i in the sequence group k is at least one of $\lfloor k \cdot N_i / N_1 \rfloor$, $\lceil k \cdot N_i / N_1 \rceil$, $\lfloor k \cdot N_i / N_1 \rfloor + 1$ and $\lceil k \cdot N_i / N_1 \rceil - 1$, wherein N_i is a length of a sequence in the candidate sequence collection, N_1 is a length of a reference sub-group sequence;

generating, by the cell or the base station or the user equipment, corresponding sequences according to the sequences in the formed sub-group; and

communicating, by the cell or the base station or the user equipment, according to the sequences on time frequency resources corresponding to the sub-group i .

Even a cursory review of this claim language shows that there is no attempt to simply claim a mathematical formula for grouping numbers. While Huawei does not dispute that the ‘239

¹² Because the independent claims of the ‘239 patent are patent-eligible under § 101 as discussed herein, the dependent claims, which are necessarily narrower than the independent claims, are patent-eligible as well. As with the ‘892 patent, the dependent claims of the ‘239 patent add further limitations to the patentable subject matter recited in independent claims 6 and 17. For example, the dependent claims add that the sequences correspond to at least one of the Zadoff-Chu or Gauss sequences (claims 7, 18), the reference sequence subgroup N_1 is a maximum sequence length, or a shortest sequence length, in the sequence group (claims 9, 20). These are specific limitations for how the base sequences and reference signal sequences are selected and generated.

1 patent claims include the value of sequence index r_i to have a value determined by at least one of
2 four mathematical formulas, mentioning a formula in a claim does not render it patent-ineligible.¹³
3 Indeed, this claim is similar to—and even narrower than—the claim found patent-eligible by the
4 Supreme Court in *Diehr*, which incorporated a mathematical formula into a claim for rubber
5 processing.¹⁴ *Diehr*, 450 U.S. at 179 n.5, 187-88.

6 Samsung admits that the challenged claims are directed to the selection and generation of
7 sequences to improve wireless telecommunications. *See* Mot. at 3-4 (admitting that the ‘239
8 patent is directed to reducing interference in a cellular telecommunications system). And Samsung
9 does not even attempt to argue that the challenged claims invoke computers “merely as a tool,” or
10 “simply add[] conventional computer components to well-known business practices.” *See Enfish*,
11 822 F.3d at 1336, 1338.

12 Rather, Samsung reiterates the same false premise that it advanced in connection with the
13 ‘892 patent – that the presence of a “mathematical formula” in claims must render them abstract.
14 Mot. at 10-11.¹⁵ The Supreme Court rejected this argument years ago, the Federal Circuit in
15 *McRO* has again confirmed the patent eligibility of claims that involve formulas algorithms, or
16 rules, and this Court in *France Telecom* found similar claims patent-eligible. *Diehr*, 450 U.S. at
17 192-93; *McRO*, slip op. at 27; *France Telecom*, 39 F. Supp. 2d at 1083; *see also* Section IV.A.1,
18 *supra*. And as it did with the ‘892 patent, Samsung again advances the legally incorrect position
19 that it can parse out individual claim elements and use them to manufacture an abstract idea. *See*
20 *McRO*, slip op. at 19.

21
22 ¹³ The four equations are: $\lfloor k \cdot N_i/N_1 \rfloor$, $\lceil k \cdot N_i/N_1 \rceil$, $\lfloor k \cdot N_i/N_1 \rfloor + 1$ and $\lceil k \cdot N_i/N_1 \rceil - 1$. These
23 equations use floor and ceiling functions (which round up and down, respectively), not square
brackets as incorrectly shown in Samsung’s motion. *Compare* ‘239 patent, claim 6 *with* Mot. at 5.

24 ¹⁴ The *Diehr* claims included the equation: “ $\ln v = CZ + x$ ” and, like the ‘239 patent claims, identified
25 the meaning of the constituent input variables. *Id.*

26 ¹⁵ All of the cases that Samsung relies upon are distinguishable for the same reasons discussed
27 above with respect to the ‘892 patent. Namely, the ‘239 patent does not claim a law of nature, a
non-statutory “device profile,” the abstract concept of gathering data, a mental process, all
information processing associated with digital information, a “purely functional” idea without any
details or grounding, or a bare formula without any details or context. *See supra* at 18-19 & n.12.

1

2. **Alice Step 2: The ‘239 Patent Claims Contain an Inventive Concept
Sufficient to Transform Any Alleged Abstract Idea into a Patent-Eligible
Application**

2

3 As with the ‘892 patent, even were the Court to conclude that the ‘239 patent claims are
4 directed to an abstract idea, each claim as a whole contains an inventive idea that transforms it into
5 a patent-eligible application. *Alice*, 134 S. Ct. at 2355. Samsung concedes that at least the alleged
6 “mathematical calculation steps themselves” in the ‘239 patent claims are not generic and may
7 “supply an inventive concept.” *See* Mot. at 12. This concession should end the inquiry.

8 Samsung again isolates the claim elements and dismisses them all as conventional, as it did
9 with the ‘892 patent and with its analysis of Step 1 of the ‘239 patent. Samsung’s approach is
10 foreclosed by jurisprudence. *See* Section IV.A.2, *supra*. The claims of the ‘239 patent, which
11 include the inventive requirement of “wherein n is a natural number, i is a serial number of the
12 sub-group, k is a serial number of the sequence group, a value of a basic sequence index r_i in the
13 sub-group i in sequence k is at least one of $\lfloor k \cdot N_i/N_1 \rfloor$, $\lceil k \cdot N_i/N_1 \rceil$, $\lfloor k \cdot N_i/N_1 \rfloor + 1$ and
14 $\lceil k \cdot N_i/N_1 \rceil - 1$, wherein N_i is a length of a sequence in the candidate sequence collection, N_1 is a
15 length of a reference sub-group sequence,” are limited to the situation where some mobile devices
16 are interacting with one cell of a cellular network and other mobile devices are interacting with
17 another cell.

18 Nothing in the ‘239 claims indicates they are meant to be applied outside of this particular
19 application. Nor would the claims prevent other ways to allocate sequences or use sub-groups,
20 candidate sequences, and sequence indices. As discussed with respect to the ‘892 patent, the
21 Supreme Court’s analysis in *Diehr*, the Federal Circuit’s analysis in *Bascom*, and this Court’s
22 analysis in *France Telecom* govern the analysis of the ‘239 patent claims, and they should be held
23 patent-eligible. *See* Section IV.A.2, *supra*.

24 **V. CONCLUSION**

25 For the reasons discussed herein, the Court should deny Samsung’s motion.

1 Dated: September 27, 2016

2 SIDLEY AUSTIN LLP

3

4 By:/s/ Michael J. Bettinger _____

5 Michael J. Bettinger

6 *ATTORNEYS FOR PLAINTIFFS*

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